

Titel 60 Year old Settlement Houses - Together Towards Passive House Plus

Index IBADDO

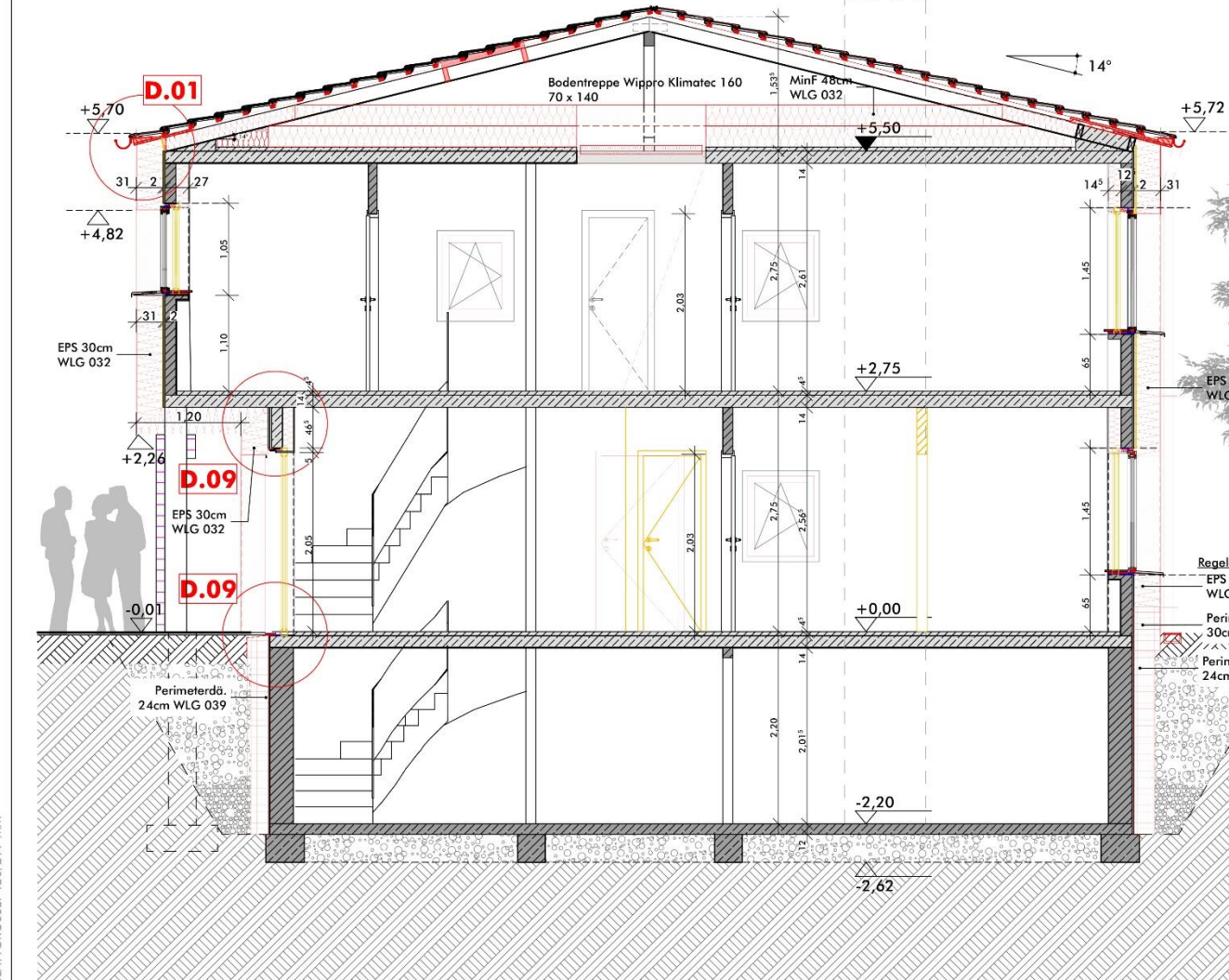
City, Country Aachen, NRW, Germany
 Climate zone Cool, temperate
 Year of completion 2017/18
 Certified as EnerPHIT House Plus (certified with raw n50: 0,7) & Passive House Plus (prenoted with corrected n50: ≤ 0,6)
 Object type Semi-detached single family dwelling
 Treated floor area [m²] 166
 Construction Rafter roof
 Top floor ceiling: 14cm concrete, retrofitted with 48 cm mineral wool 032
 Exterior walls: 1958/59 masonry hollow block construction retrofitted 2017 with 12 - 30cm ETICS 032
 Exterior walls basement: concrete hollow block masonry retrofitted with 2x12 cm XPS
 Floor: 12cm concrete at 220cm depth (only soil insulated)

Refurbishment Challenges



- Lack of insulation roof, wall, floor
- Outdated window technology
- Lack of air tightness
- Large number of thermal bridges
- A/V ratio suboptimal
- Suboptimal orientation NW/SE
- Considerable shading of entrance area, loggia and terrace by fixed overhangs, extra terrace roof
- Lack of solar gains
- Uncontrolled window ventilation
- Basement exit uninsulated
- Low basement ceiling (2m) uninsulated, no space for adding insulation
- Heating demand approx. 350 kWh/m²a
- PER primary energy demand approx. 700 kWh/m²a

Answers

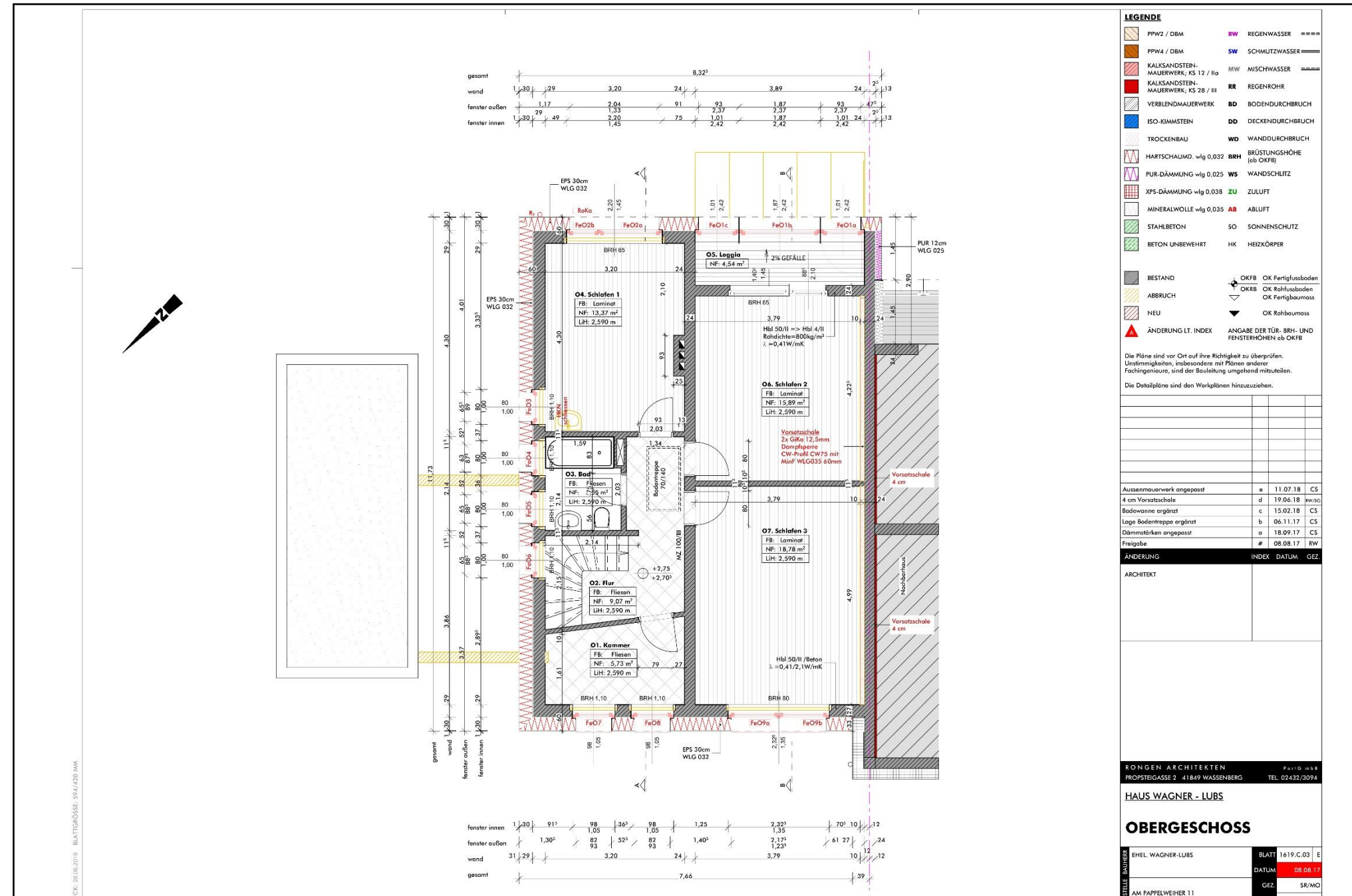
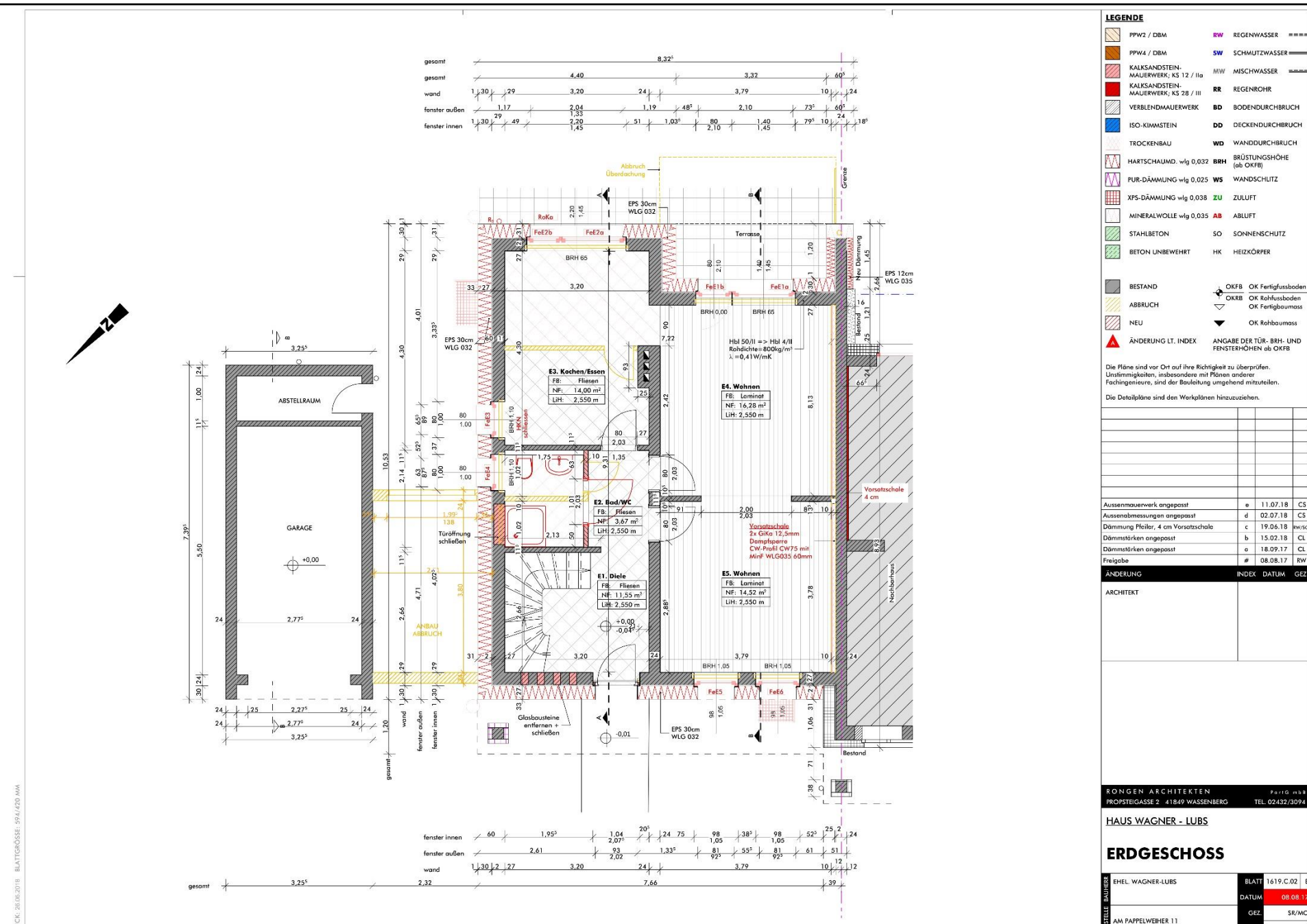


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U-values [W/(m²K)]

Exterior wall	0,10
Roof	0,07
Ground floor	3,3 without and 0,3 with insulating soil
Windows	0,74
Glazing	0,50
g-value of glazing [%]	53%

Airtightness concept Airtightness layer interior plaster. Connection to windows and to roof is via plaster able tapes



n₅₀-value [1/h] 0,7 (raw 2018 without supporting pressure in neighbour house) 0,6 (final 2021, prenoted)

Ventilation system Paul, Focus: cascaded controlled ventilation with a highly efficient central heat recovery unit (91%) using existing shafts, stairs for minimizing duct work, cost, distribution effort

Heating/cooling/dehumidification/domestic hot water PV-assisted micro heat pump HauteCarno 5.2 kW, propane, HCS PN 15 with 100m ground probe and 600l heat storage serving both semi-detached houses together (total 367m² energy reference area, max heating load 11 W/m²). The existing radiator system can be efficiently used at a greatly reduced temperature level of 30/35C in both dwellings. Hot water lines partially renewed, shortened.

Renewable energies PV: 6,3 kWp array on south-east facing slightly tilted roof. Environmental heat: about 10.000 kWh/a or 27 kWh/m²a collected via shared heat pump and ground probe. Rain water

Other Ecological aspects Reuse of existing building fabric & heat distribution system together with sharing ground heat pump system drastically saves materials, grey energy, emissions - while additional of warm usable space 60m² is created. The dwelling is a "plus house" in terms of its annual energy balance.

According to PHPP

PHPP-version	9.7
Heating demand	21 [kWh/(m²a)]
Heat load	10-11 [W/m²]
Cooling demand	0 [kWh/(m²a)]
Cooling load	0 [W/m²]
Overheating	0 [%]
PER demand	38 [kWh/(m²a _{TFA})]
PER production	55 [kWh/(m²a)]
PE demand	54 [kWh/(m²a)]

Further notes (e.g. comments on hydrothermal and acoustic comfort) Together: Triggered by the neighbour's project ("Towards... Passive House Plus", cf. presentation 21st PH conf. Vienna & NRW project of the month) & the Philips Pioneer Project Aachen (passipedia) ... committed owners maximize the synergy of shared expert teams & shared Passive House knowledge & shared renewable energies to make Passive Houses Plus possible even in a 60-year-old settlement!

